

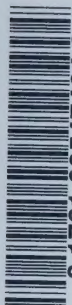
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SOIL LEAD LEVELS IN ONTARIO. / Rinne, R. 1988.

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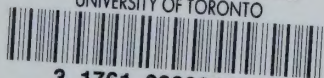


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SOIL LEAD LEVELS IN ONTARIO

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SUMMARY OF ONTARIO MINISTRY OF THE ENVIRONMENT (MOE) SOIL
LEAD RESULTS FOR AREAS NOT CONSIDERED TO BE INFLUENCED BY
INDUSTRIAL POINT SOURCES OF LEAD

Area	Sample Size	Mean ^a	S.D.	Range	Guideline ^b
Urban ^c	500	123	121	5 - 845	500
Small Town ^d	73	34	27	2 - 133	-
Rural	386	35	39	5 - 360	150

a. ug/g, dry weight, 0-5 cm depth (1972-1982 data)

b. "upper limit of normal" guideline (mean plus 3 S.D.)

c. $\geq 10,000$ population

d. $< 10,000$ population



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SOIL LEAD LEVELS IN URBAN RESIDENTIAL AREAS OF ONTARIO NOT
CONSIDERED TO BE INFLUENCED BY CURRENT INDUSTRIAL POINT
SOURCES OF LEAD

Area	Sample Size	Mean ^a	S.D.	Range	Est. % of Properties >500 ug/g
City of Toronto	233	121	142	5 - 845	2 %
City of Windsor (pop. 200,000)	225	119	95	25 - 633	0.8 %
City of Guelph (pop. 75,000)	39	158	93	24 - 305	0.5 %
S. Riverdale (Toronto) 500-1500 m from CMC ^b	45	419	214	29 - 845	40 %
MOE Control Area (Toronto) 1500 m from CMC	20	315	162	40 - 610	30 %

a. ug/g, dry weight, 0-5 cm depth (MOE data, 1972-1985)

b. CMC = Canada Metal Company

SOIL LEAD LEVELS NEAR MAJOR ROADWAYS IN TORONTO, OUTSIDE
THE ZONE OF INFLUENCE OF CURRENT INDUSTRIAL POINT SOURCES

- up to 1850 ug/g in top 1 cm within 5 m of Queen's Park Circle
(University of Toronto, 1972 study)
 - 65 intersections in metro Toronto. - study repeating every 10 yrs.
 - up to 1950 ug/g in top 2.5 cm at 7.5 m from street intersections
(mean 295 ug/g; MOE, 1981 study)
 - 560 ug/g in top 5 cm within 8 m of Hwy. 400 and Hwy. 401 intersection
(MOE, 1980 study)
-

METROPOLITAN TORONTO SOIL SURVEY - SUMMARY OF TRAFFIC
INTERSECTION SOIL LEAD RESULTS FOR 1971 AND 1981

Distance from intersection:	7.5 m				25 m			
Sampling depth:	0 - 2.5 cm		10 - 15 cm		0 - 2.5 cm		10 - 15 cm	
Year of sampling:	1971	1981	1971	1981	1971	1981	1971	1981
Soil Pb - mean ^a :	286 n.s.	295	181 n.s.	182	218 n.s.	229	112 n.s.	151
Soil Pb - S.D.:	320	297	215	282	228	219	108	188
Soil Pb - range:	20- 1850	30- 1950	17- 1060	8- 1900	18- 1220	12- 900	13- 670	10- 875

a. ug/g, dry weight (MOE data)

n.s. means are not significantly different ($p=0.05$, two-sided paired t-test)

Sample size (n) = 65

MAXIMUM MEASURED SOIL LEAD CONCENTRATIONS NEAR SECONDARY
LEAD SMELTERS IN TORONTO AND MISSISSAUGA

Smelter	Max. Level on Non- residential Property ^a (publicly accessible) 1986-87	Max. Level on Residential Property ^a	
		1976	1986-87
Tonolli, Mississauga next ↑ year.	39,000 (boulevard)	11,800 (backyard) ^r	2800 (boulevard)
Toronto Refiners & Smelters	64,500 (near gate)	11,500 (backyard) ^r	4450 (garden)
Canada Metal, Toronto	10,600 (lawn)	8600 (front yard) ^r 13,700 (parking area)	7700 (front yard) 11,000 (parking)

a. ug/g, dry weight, 0-5 cm depth (MOE data)

r. indicates soil was replaced in 1977-78

↑
note: some properties
had soil replaced
1977-78.

-any soil > 2600 ppm.

SOIL LEAD CONCENTRATIONS NEAR SECONDARY LEAD SMELTERS
- RESIDENTIAL PROPERTIES WITHOUT KNOWN SOIL REPLACEMENT

Location of Properties	1976		1985-87	
	Mean ^a	Range	Mean	Range
Toronto Refiners & Smelters -abutting property (n=5)	840	305 - 1460	n.s. 1130	610 - 1600
Toronto Refiners & Smelters -100 to 200 m distant (n=30)	827	272 - 2080	*** 583	220 - 1400
Tonolli -400 to 700 m distant (n=54)	883	214 - 2100	n.s. 813	325 - 2500
Canada Metal -50 to 400 m distant (n=198)	1538	335 - 2560	? 1294	210 - 3250

a. ug/g, dry weight, 0-5 cm depth (MOE data)

n.s. means are not significantly different (p=0.05, two-sided paired t-test)

*** means are significantly different (p=0.001, two-sided paired t-test)

Summary of Average School Yard Soil Lead Levels

Area Sampled	Soil Lead Levels ($\mu\text{g/g}$ dry weight) (0-5 cm depth)					
	All Samples Included			Sandy and Baseball Diamond Soils Excluded		
	Mean $\pm$ S.D.*	Range	n**	Mean $\pm$ S.D.	Range	n
Windsor (urban)	54 $\pm$ 42 a***	4-180	30	72 $\pm$ 39 ac	23-180	20
Toronto (urban)	48 $\pm$ 32 ac	11-120	17	54 $\pm$ 36 ac	11-120	12
Walpole (rural)	25 $\pm$ 41 bc	< 3-170	29	42 $\pm$ 55 bc	7 - 170	14
Scarborough (suburban)	20 $\pm$ 15 b	4-81	23	22 $\pm$ 16 b	6-81	19
Etobicoke (suburban)	12 $\pm$ 9 b	3-28	17	20 $\pm$ 8 b	6-28	8
Longwoods (rural)	13 $\pm$ 10 b	< 3-51	26	15 $\pm$ 10 b	7-51	17
Walpole (excl. Dunnville)	11 $\pm$ 8 b	< 3-33	20	16 $\pm$ 9 b	7-33	10

* S.D. = standard deviation

** n = sample size

*** Means in the same columns followed by the same letter are not significantly different (two-sided t-test) at $p \leq 0.05$.

(MOE, 1984 data)

SUMMARY AND CONCLUSIONS

- Lead concentrations in surface soil (0-5 cm depth) may commonly exceed 500 ug/g near major roadways and busy intersections and in older, downtown areas of cities.
 - Lead concentrations in surface soil (0-5 cm depth) of >1000 ug/g are not often found except in the vicinity of secondary lead smelters, waste dumps, and on small areas of individual properties adjacent to walls from which lead-based paint has peeled away.
 - Soil lead concentrations in parks and school yards are generally lower than on adjacent residential properties, probably reflecting greater distances of sampling sites from roadways and painted structures.
 - In general, urban soil lead concentrations have shown very little change since 1976. There appears to be a trend toward lower soil lead concentrations, however, as evidenced by slight decreases in means of several studies.
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Oct. 18/91

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REFERENCES

- Angle, C.R. and McIntire, M.S. 1979. Environmental Lead and Children: the Omaha Study. J. Toxicol. Environ. Health 5: 855-870.
- Barltrop, D., Thornton, I., Strehlow, C.D. and Webb, J.S. 1975. Absorption of Lead from Dust and Soil. Postgrad. Med. J. 51: 801-804.
- Bornschein, R.L., Succop, P., Krafft, K.M., Clark, C.S., Peace, B. and Hammond, P.B. 1986. Exterior Surface Dust Lead, Interior House Dust Lead and Childhood Lead Exposure in an Urban Environment. Presented at the 20th Annual Conference on Trace Metals in Environmental Health, June 2 - 5, 1986, University of Missouri, Columbia.
- Chant, D.A., DeMarco, F.A. and Robertson, H.R. 1974. Effect on Human Health of Lead from the Environment. Ontario Ministry of Health, Toronto.
- Charney, E., Kessler, B., Farfel, M. and Jackson, D. 1983. Childhood Lead Poisoning: a Controlled Trial of the Effect of Dust-Control Measures on Blood Lead Levels. New Engl. J. Med. 309: 1089-1093.
- Duncan, C., Kusiak, R.A., O'Heany, J., Smith, L.F., Spielberg, L. and Smith J. 1985. Blood Lead and Associated Risk Factors in Ontario Children, 1984. Ontario Ministries of Health, Labour and Environment, Toronto.
- Jones, A.R. 1987. South Riverdale Soil Lead Levels: An Explanation for the Recontamination of Some Residential Properties in the Vicinity of Canada Metal Co. Ltd. Technical Report. Ontario Ministry of the Environment, Central Region, Toronto.
- Macpherson, A.S. 1986. South Riverdale Blood Lead Testing-1985. City of Toronto Department of Public Health, Toronto.
- Macpherson, A.S. 1987(a). Children's Blood Lead Levels and Environmental Risk Factors in the South Riverdale Neighbourhood of Toronto and Other Areas of Ontario: A Comparison Study. City of Toronto Department of Public Health, Toronto.
- Macpherson, A.S. 1987(b). South Riverdale Blood Lead Testing. - 1986. City of Toronto Department of Public Health, Toronto.

APPENDIX

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